discount on more recent new switch purchases of this technology.[1038]

398.   We reject the new switch discounts proposed by AT&T/WorldCom for use in Verizon's switching cost study because they are based on older contracts that may not reflect the discount Verizon would receive for new switches obtained though a competitive bidding process.[1039] We have been unable to determine the dates of some of the contracts on which AT&T/WorldCom rely,[1040] but the contract with Lucent for 5ESS switches, which account for a large majority of Verizon's switch costs and lines in its study,[1041] is a 1997 contract that was not subject to a competitive bidding process.[1042] The parties agreed, however, that new switch prices reflected in prior vendor contracts typically represent the highest prices that Verizon would pay, given that it might obtain a lower price from competitive bids.[1043] Use of prior contract prices for new switches may therefore overstate the price that an efficient carrier would pay today for a new switch. Thus we conclude that Verizon's year 2000 new switch purchases, which it made pursuant to a competitive bid process, are the best record evidence of the new switch discounts an efficient carrier would receive. Finally, we note that, in any event, the discounts reflected in the contracts proffered by AT&T/WorldCom are comparable to those Verizon received for its 2000 new switch purchases, particularly for Lucent 5ESS switches.

(b)   Tandem Switch "Getting Started" Investment

399.   We adopt discounts for estimating tandem switching "getting started" investment for Lucent 5ESS and DMS-200 switches that are the same as the discounts Verizon actually received on new end-office switch purchases in 2000.[1044] We find that tandem switching "getting started" investment is best estimated using these discounts for three reasons. First, these are discounts actually received on relatively recent new switch purchases. Second, no party argues that there is a difference between the vendor discounts that apply to end-office and tandem switching equipment. Verizon uses the same vendor discount in its tandem switching study as it

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[1038] AT&T/WorldCom Switching Cost Brief at 13 n.14. The information on the new switch discount that Verizon received in 2000 from the vendor of this particular technology apparently was not available to AT&T/WorldCom before they submitted their re-statement.

[1039] Verizon Ex. 122, at 173; Verizon Ex. 216P (confidential version); Verizon Ex. 217P (Verizon response to record request no. 33 (requested Nov. 28, 2001)) (confidential version).

[1040] *See* AT&T/WorldCom Ex. 12, Attach. 3; Verizon Ex. 218P (Verizon response to record request no. 34 (requested Nov. 28, 2001)) (confidential version). Neither of these sources provides copies of the contracts relied on by AT&T/WorldCom or clearly indicates the years these in which these contracts were executed.

[1041] *See* Verizon Ex. 123, at 10.

[1042] *See* Verizon Ex. 218P (confidential version).

[1043] AT&T/WorldCom Ex. 12, at 104; Tr. at 5269-71.

[1044] We direct Verizon to use in its compliance filing the new Lucent 5ESS and DMS-100 switch discounts identified in its response to staff record request no. 32. *See* Verizon Ex. 216P (confidential version).

does in its end-office switching study.[1045] AT&T/WorldCom re-state Verizon's end-office and tandem switching study using the same vendor discount.[1046] Third, nine of the 13 switches for which investment is developed in Verizon's tandem switch study provide both tandem and end-office switching functions.[1047]

(ii)   Other Switch Investment

400.   In order to implement our conclusion that switching costs should reflect a combination of new and growth purchases,[1048] we must develop weights to assign to the new and growth switch discounts. As we explain more fully below, to determine the appropriate weights, we must estimate, for end-office switches, line growth over the life of the switch and, for tandem switching, tandem trunk growth over the life of the switch.

(a)   End-Office Switch Investment (Other Than "Getting Started," Trunk Port, and SS7 Link Investment)

401.   To estimate end-office switching investment, other than "getting started" investment and trunk port and SS7 link investment (other end-office switch investment), we adopt weighted average discounts for the Lucent 5ESS, Nortel DMS-100, and Siemens EWSD switches.[1049] We require Verizon to modify its end-office switching study by: (1) calculating the weighted average discount for each of these switch technologies using the discounts and the new line and growth line weights discussed below; and (2) estimating other end-office switch investment for each of these switch technologies using each of these weighted average discounts.

402.   *Weighting*. We determine the new switch and growth equipment weights for use in calculating the weighted average discount applicable to other end-office switch investment as follows: First, we assume that a new switch sized to serve current demand is placed in service today, and then we calculate the percentages of the present value for the investments required for all lines expected to be installed on the switch over its life representing both lines installed today (new lines) and lines expected to be installed on the switch over its life other than those installed

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[1045] Verizon Ex 107, at 194, 207-208.

[1046] AT&T/WorldCom Ex. 12, at 104, Attach. 3.

[1047] The nine switches that provide both end-office and tandem switching functions are Lucent 5ESS switches. Verizon also develops in its study investment for one 5ESS tandem switch and three Nortel DMS-200 switches that provide only tandem switching. Verizon Ex. 161P, at 5, Attach. H.

[1048] *See supra* para. 386.

[1049] The weighted average discounts that we adopt in this order are to be calculated by: (1) multiplying the weight we adopt for the new switch discount by the new switch discount we adopt; (2) multiplying the weight we adopt for the growth switch equipment discount by the growth switch equipment discount we adopt; and (3) summing (1) and (2).

today (growth lines). The first percentage is the weight that applies to the new discount. The second percentage is the weight that applies to the growth discount. Present values are appropriate because they recognize that money has a time value, and the capital outlay for the growth lines is incurred in the future, not today.[1050]

403. We base the present value analysis on the following assumptions: (1) a cost of capital of 12.95 percent as discussed in section III(C)(3) *supra*; (2) a 2.5 percent annual line growth rate, as explained below; (3) growth lines are installed every two years;[1051] and (4) a switch life of 12 years as discussed in section III(D)(3) *supra*. Given these assumptions, the percentage of new lines installed on the switch is 88 percent, and the percentage of growth lines is 12 percent.[1052]

404. The 2.5 percent annual line growth rate is our finding of estimated line growth over the 12-year life of a switch that is placed into service today. This growth rate estimate is consistent with the annual switched line growth rate assumed by Verizon in its switching cost study for the period 2001-2003.[1053] It is lower than the 4.58 percent annual switched line growth rate assumed by AT&T/WorldCom in the MSM for the period 2001-2002.[1054] We find that the AT&T/WorldCom forecasted growth rate is too high for their forecasted periods, and much too high for the 12-year life of a switch placed in service today. ARMIS data show that Verizon VA's switched access lines grew at rates of 5.01, 6.68, 5.62, 5.01, .51, and -5.13 percent for 1996 through 2001, respectively.[1055] The geometric average annual growth rate for the period 1996-2001 is 2.87 percent, and the arithmetic average annual growth rate is 2.95 percent. These numbers capture the growth rate after the passage of the 1996 Act. More recently, growth has slowed. The geometric average annual growth rate for the years 1999-2001 is .05 percent, and the arithmetic average annual growth rate for this period is .13 percent. These numbers capture the more recent downward trend in the rate of growth of switched access lines. In light of these trends, we find that a 2.5 percent growth rate is a reasonable estimate of the growth rate of Verizon VA's switched access lines over the next 12 years.

[1050] One generally prefers having an amount of money today to having the same amount of money at some point in the future. Consider the worth of a dollar received today versus the worth of a dollar received in the future. The dollar that is received today is worth more than one received in the future because a return on today's dollar may be earned immediately by investing it, but none may be earned on a future dollar until it is received.

[1051] The assumption that growth lines are installed every two years is based on the opinions expressed at the hearings by both Verizon and AT&T/WorldCom. Both parties agreed that LECs typically add lines to the switch approximately every two or three years. Tr. at 5265-67. There is no significant difference in the results of the present value analysis if lines are assumed to be added every three years, rather than every two years.

[1052] *See* Appendix C.

[1053] Verizon Ex. 226P (confidential version).

[1054] AT&T/WorldCom Ex. 23, Attach. D.

[1055] ARMIS Report 43-08: Switch Access Lines in Service by Technology.

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405.   *New and Growth Switch Discounts.* We must select new and growth switch discounts in order to calculate the weighted average discount used to estimate other end-office switching investments. For the reasons set forth above, [1056] we adopt new switch discounts based on the new switches Verizon purchased in 2000. [1057]

406.   We adopt growth switch discounts for the Lucent 5ESS and the Siemens EWSD based on the growth and upgrade purchases Verizon made in 2000 [1058] because they are discounts actually received on recent growth and upgrade purchases. For Nortel DMS-100 switches, we adopt a growth switch discount that is based on the discount Verizon receives on growth and upgrade purchases under its current contract. [1059]

(b)   Tandem Switch Investment Other Than "Getting Started" Investment

407.   Based on the weights and discounts discussed below, we adopt weighted average discounts to estimate tandem switching investment, other than "getting started" investment (tandem switching other investment), for the Lucent 5ESS and Nortel DMS-200 switches. We require Verizon to modify its tandem-office switching study by: (1) calculating the weighted average discount for each of these switch technologies using the discounts and the new trunk and growth trunk weights discussed below; and (2) estimating tandem switching other investment for each of these switch technologies using each of these weighted average discounts.

408.   *Weighting.* We determine the new tandem switch and growth equipment discount weights for use in calculating the weighted average discount applicable to tandem switching other investment as follows: First, we assume that a new tandem switch sized to serve current demand is placed in service today, and then we calculate the percentages of the present value of

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[1056] *See supra* section V(C)(1)(b)(i)(a).

[1057] We direct Verizon to use the new Lucent 5ESS, Nortel DMS-100, and Siemens EWSD switch discounts identified in its response to staff record request no. 32 in its compliance filing. *See* Verizon Ex. 216P (confidential version).

[1058] We direct Verizon to use as the growth discount for the Lucent 5ESS and Siemens EWSD switches in its compliance filing the growth discounts that it identified for each of these switches in response to staff record request no. 29. *See* Verizon Ex. 213P (confidential version). The Lucent 5ESS growth discount identified in Verizon's response to this record request is equal to the Lucent discount in Verizon's cost study. *Compare id., with* Verizon 100P, Vol. IX, VA Switch Discount Support, Exhibit Part C-P1 (confidential version). The Siemens growth discount identified in Verizon's response to this record request is based on the switch equipment expenditure data identified in the cost study accompanying Verizon's surrebuttal panel testimony. *See* Verizon Ex. 125P, Attach. O, (revised) Exhibit C-P3 (confidential version). It is not identical to the discount in Attachment O because the data in that attachment include expenditures on new switch and growth and upgrade equipment. The Siemens discount identified in response to the record request reflects only expenditures on growth and upgrade equipment.

[1059] We direct Verizon to use as the growth discount for the DMS-100 switch in its compliance filing the Nortel discount identified in Verizon's cost study. *See* Verizon Ex. 100P, Vol. IX, VA Switch Discount Support, Exhibit Part C-P2, at 2 (confidential version).

the investments required for trunks expected to be installed on the switch over its life representing: (1) trunks installed today (new trunks); and (2) trunks expected to be installed on the switch over its life other than those installed today (growth trunks). The first percentage is the weight that applies to the new discount. The second percentage is the weight that applies to the growth discount.

409.   We base the present value analysis for other tandem investment on the assumptions we use to calculate other end-office investment, except that we assume a three percent annual trunk growth rate. Given these assumptions, the percentage of new trunks installed on the switch is 85 percent, and the percentage of growth trunks is 15 percent.[1060]

410.   Trunk growth is a function of busy hour switched access usage growth, which in turn is a function of switched access line growth and busy hour switched access usage per line growth. We estimate that the expected busy hour switched access usage per line growth rate over the 12-year life of a switch is approximately five percent per year, given forecasts of 2.5 percent per year switched access line growth, as explained in para. 404, above, and 2.5 percent per year busy hour switched access usage per line growth, as explained below.

411.   The annual 2.5 percent busy hour usage per line growth rate is lower than the annual busy hour usage per line growth rate assumed by Verizon in its switching cost studies for the period 2001-2003.[1061] We find that Verizon's claimed usage per line growth rate is too high for its study period and much too high for a 12-year life of a switch placed in service today. Our 2.5 percent estimate for busy hour usage per line growth is based on ARMIS data showing that Verizon VA's all hour of the day (not busy hour) usage per switched access line grew at rates of 5.76, 3.38, 2.01, 7.72, 4.89, and 4.19 percent for 1996 through 2001, respectively. The geometric average annual growth rate for the period 1996-2001 is 4.64 percent. The arithmetic average annual growth rate for this period is 4.66 percent. In this case, however, past usage per switched access line growth may not be indicative of future growth. A principal reason for usage per switched access line growth since 1996 is dial-up Internet usage growth. Going forward, however, dial-up Internet growth rates and therefore switched access usage growth rates should slow, as Internet usage over DSL and cable modem lines increases.[1062] It seems

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[1060] *See* Appendix D.

[1061] Verizon Ex. 226P *(confidential version).*

[1062] The Bureau estimated that only one percent of occupied housing units in Virginia had a high speed line in service as of December 1999, whereas 15 percent had such a line as of December 2002. *See Federal Communications Commission Looks at Data on Growth of Broadband Subscribership In Rural Areas,* FCC Press Release (Aug. 6, 2003). This growth in high speed lines coincides with the successively slower usage per switched access line growth rates reflected in the ARMIS data for Verizon Virginia subsequent to 1999. The Bureau also *estimated that only two percent of occupied housing units nation-wide had a high speed line in service as of* December 1999, whereas 16 percent had such a line as of December 2002. *Id.* Thus, the growth in Virginia high-speed lines mirrored nation-wide growth. Nielsen/NetRatings recently reported that time spent online nationally by high-speed Internet subscribers in January 2003 rose 64 percent from the prior January while time spent online by dial-up subscribers decreased three percent. *See Broadband access outpacing dial-up connections* (Mar. 5, 2002) (continued....)

reasonable to expect, therefore, that switched access usage over the next 12 years will be closer to the lowest growth rate during the 1996-2001 period, 2.01 percent in 1998, than the 1996-2001 average growth rate of approximately 4.7 percent. Thus we find that a 2.5 percent switched access usage per line per year growth rate is a reasonable estimate for Verizon VA over the next 12 years.[1063]

412. Verizon forecast both the annual growth rate of busy hour switched access usage[1064] and the annual growth rate of trunks.[1065] Its predicted trunk growth rate is approximately 41 percent lower than its predicted busy hour switched access usage growth rate.[1066] We find that Verizon's busy hour switched access usage growth rate is too high because it is based, in part, on a busy hour usage per line forecast that we determined is too high.[1067] We base the trunk growth rate on the busy hour switched access usage growth rate we adopt above,[1068] five percent per year, reduced by the amount by which Verizon's switched access usage growth rate exceeds its trunk growth rate. This calculation results in a switched access trunk growth rate of approximately three percent (a busy hour switched access usage growth rate of five percent per year less 41 percent).

413. *New and Growth Switch Discounts.* We must select new and growth switch discounts in order to calculate the weighted average discounts used to estimate other tandem switch investments. For the reasons set forth above,[1069] we base the new switch discounts on the

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<http://www.usatoday.com/tech/news/2002/03/05/broadband- report.htm>. We would expect roughly the same usage changes in Verizon Virginia's territory as these nation-wide usage changes.

[1063] We also note that there is no obvious basis in the record for developing a busy hour growth rate forecast that differs from an all hour of the day forecast.

[1064] Verizon's annual growth rate forecast of busy hour switched access usage is equal to its line growth rate forecast plus its busy hour usage per line growth rate forecast. *See* Verizon Ex. 107, at 200-201; Verizon Ex. 226P (confidential version); Verizon Ex. 125P, CD-ROM "VZ-VA FCC ARB (Additional Cost Studies)," Folder "VA EXCEL and WORD STUDIES," Folder "VA SWITCHING SUPPORT FILES," Folder "VA UNBUNDLED REC & SWITCH," Excel File "Backup VA MOUR-10-31 Part C-8," Worksheet "EO MOU," cells C58, D58, D60, Worksheet "Tdm MOU," Cells G12, G14, G21 (confidential version); Verizon Ex 161, at 5, Attach. H.

[1065] Verizon Ex. 125P, CD-ROM "VZ-VA FCC ARB (Additional Cost Studies)," Folder "VA EXCEL and WORD STUDIES," Folder "VA SWITCHING SUPPORT FILES," Folder "VA UNBUNDLED REC & SWITCH," Excel File "Backup VA MOUR-10-31 Part C-8," Worksheet "EO MOU," cell D60, Worksheet "Tdm MOU," Cells G12, G14, G21 (confidential version); Verizon Ex 161, at 5, Attach. H.

[1066] *See supra* notes 1064-65.

[1067] *See supra* para. 411.

[1068] *See supra* section V(C)(1)(b)(i)(b).

[1069] *See supra* section V(C)(1)(b)(i)(a).

discounts Verizon received on new switch purchases in 2000.[1070] We adopt growth switch discounts for the Lucent 5ESS switches based on the growth and upgrade purchases Verizon made in 2000.[1071] For Nortel DMS-200 switches, we adopt a growth discount based on growth and upgrade purchases Verizon expects to make under its contract with Nortel.[1072] These discounts are appropriate for the reasons we give above and because they relate to Verizon's expenditures for both tandem and end-office equipment.[1073]

(iii) End-Office Switch Trunk Port and SS7 Link Investment

414. Based on the weights and discounts discussed below, we adopt for estimating end-office trunk port and SS7 link investment weighted average discounts for the Lucent 5ESS, Nortel DMS-100, and Siemens EWSD switches. We require Verizon to modify its end-office switching study by: (1) calculating the weighted average discount for each of these switch technologies using the discounts and the new trunk and growth trunk weights discussed below; and (2) estimating end-office trunk port and SS7 link investment for each of these switch technologies using each of these weighted average discounts.

415. *Weighting.* We calculate these weighted average vendor discounts using weights reflecting the three percent per year trunk port growth rate that we developed above, resulting in 85 percent new switch trunks and 15 percent growth trunks.[1074] We use the trunk growth rate to estimate the vendor discount for both end-office and tandem trunk ports because there is no reason to expect that they would grow at different annual rates. Verizon uses the same trunk growth rate forecast in its tandem and end-office switching cost studies, as do AT&T/WorldCom in their re-statement of these studies.[1075] We use the trunk growth rate to estimate the vendor

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[1070] We direct Verizon to use the new Lucent 5ESS and Nortel DMS-100 switch discounts identified in its response to staff record request no. 32 as the new switch discounts for Lucent 5ESS and Nortel DMS-200 tandem switches in its compliance filing. *See* Verizon Ex. 216P (confidential version); *see also infra* section XIII.

[1071] We direct Verizon to use as the growth discount for Lucent 5ESS tandem switches in its compliance filing the growth discounts that Verizon identified for Lucent 5ESS switches in response to staff record request no. 29. *See* Verizon Ex. 213P (confidential version). The Lucent 5ESS switch growth discount identified in Verizon's response to this record request is the same as the Lucent 5ESS discount identified in Verizon switching cost study. *Compare id., with,* Verizon 100P, Vol. IX, VA Switch Discount Support, Exh. Part C-P1 (confidential version).

[1072] We direct Verizon to use as the growth discount for DMS-200 tandem switches in its compliance filing the Nortel discount identified in Verizon's cost studies. *See* Verizon Ex. 100P, Vol. IX, VA Switch Discount Support, Exh. Part C-P2 at 2 (confidential version).

[1073] Verizon Ex. 107, at 194.

[1074] *See supra* para. 409.

[1075] Verizon Ex. 125P, CD-ROM "VZ-VA FCC ARB (Additional Cost Studies)," Folder "VA EXCEL and WORD STUDIES," Folder "VA SWITCHING SUPPORT FILES," Folder "VA UNBUNDLED REC & SWITCH," Excel File "Backup VA MOUR-10-31 Part C-8," Worksheet "EO MOU," cells D58, D60, Worksheet "Tdm MOU," cells G9, G12, G14, G21 (confidential version); AT&T/WorldCom Ex. 24P, CD-ROM "VZ-VA FCC ARB, Docket (continued....)

discount for end-office SS7 link investments because these investments are needed only for inter-office traffic.

416.   *Switch Discounts.* For the reasons set forth above, we require Verizon to calculate these weighted average vendor discounts using the new and growth discounts that we require it to use to estimate other end-office investment.[1076]

2.   Switch Demand and Sizing

417.   There is a need for consistency between the line and trunk growth assumptions we make to calculate the weighted average discount, the physical size of the switch for which the discount is used to estimate investment, and the number of line ports, trunk ports, and minutes of use over which to spread the investment. If there is an inconsistency, cost per unit may be overstated or understated.

418.   Regarding physical size, we therefore require that end-office switch investment be based on a switch sized physically to accommodate the present value of the investments required for the number of lines and trunks it will serve over a 12-year period, assuming a 2.5 percent annual rate of line growth, a three percent annual rate of trunk growth, and that these lines and trunks are installed every two years. We also require that tandem office switch investment be based on a switch sized physically to accommodate the present value of the investments required for the number of trunks it will serve over a 12-year period, assuming a three percent annual rate of trunk growth, and that trunks are installed every two years.

419.   Regarding demand, we require that the line port demand over which to spread end-office investment reflect the present value of the investments required for the number of line ports demanded over a 12-year period, assuming a 2.5 percent annual rate of line growth and that line demand grows every year. For developing dedicated tandem trunk port prices, we require that the trunk port demand over which to spread trunk port investment reflect the present value of the investments required for the number of trunk ports demanded over a 12-year period, assuming a three percent annual rate of trunk port growth, and that trunk port demand grows every year. For developing common trunk port prices, we require that the minutes of use over which trunk port investment is spread reflect the present value of the investments required for the number of tandem switch minutes demanded over the a 12-year period, assuming a five percent annual rate of minutes growth, and that tandem trunk demand grows every year.

420.   We also require that end-office and tandem office switch investment be based on traffic and subscriber calling characteristics (*e.g.*, busy hour calls per trunk), identical to those in Verizon's proposed cost study, except for busy hour hundred call seconds (CCS) per line and per

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00251, Workpapers Supporting Supplemental Surrebuttal of Catherine E. Pitts," Folder "VA Unbundled REC & SWITCH," Excel File "Switch Backup," Worksheet "EO MOU," cells D58, D60, and Worksheet "Tdm MOU," cells G9, G12, G14, G21 (confidential version).

[1076] *See supra* paras. 405-06.

trunk assumptions. Busy hour CCS per line and per trunk assumptions must reflect the sizing and demand assumptions set forth in the two previous paragraphs.

3.   Digital Loop Carrier

a.   Positions of the Parties

421.   In its switching cost study, Verizon assumes a mix of 42.4 percent analog ports and 57.6 percent IDLC ports.[1077] Verizon bases these percentages on inputs from its loop cost study. In that study, Verizon assumes that 57.6 percent of loops use IDLC systems and that 42.4 percent of loops either use UDLC systems or are all-copper loops.[1078] Further, as in its loop study, Verizon assumes that ten percent of all loops use GR-303 IDLC switch interface technology and that the remaining IDLC loops use TR-008 switch interface technology.[1079] For the ten percent of lines that are served using GR-303 IDLC systems, Verizon assumes a line concentration ratio of 3:1, based on the experience of its engineers, who, Verizon contends, balance the resource savings associated with higher concentration ratios against the risk of blocked calls if the concentration ratio is too high.[1080]

422.   AT&T/WorldCom challenge the mix of analog to digital line ports, and the DLC assumptions on which they are based, in the Verizon cost study. They propose an assumption that all DLC-based lines (82 percent in the Verizon study) use GR-303 NGDLC systems and therefore enter the switch via a digital port.[1081] They therefore propose a digital to analog port ratio of 82:18. AT&T/WorldCom argue that NGDLC technology is currently available and may be used to provide unbundled loops.[1082]

423.   Verizon claims, as it does in its loop analysis, that AT&T/WorldCom assume an unjustifiably high percentage of NGDLC loops.[1083] Verizon argues that UDLC loops are necessary to provide stand-alone unbundled loops and that, given that Verizon-East has deployed almost no GR-303 NGDLC systems, it is appropriate to assume the use of TR-008 IDLC systems in a forward-looking cost study.[1084]

[1077] Verizon Ex. 107, at 187; Verizon Switching Cost Brief at 12.

[1078] *See supra* section IV(C)(2)(k)(ii).

[1079] Verizon Ex. 107, at 187; Verizon Switching Cost Brief at 12-13; *see also supra* section IV(C)(2)(k)(ii).

[1080] Verizon Ex. 122, at 183-85; Verizon Switching Cost Brief at 14-15.

[1081] AT&T/WorldCom Ex. 12, at 104-07; AT&T/WorldCom Ex. 24, at 9-10

[1082] *See supra* section IV(C)(2)(k)(ii).

[1083] *See id.*

[1084] *See* Verizon Switching Cost Brief at 12-14.

424. AT&T/WorldCom also contend that Verizon's 3:1 line concentration ratio is too low and that the appropriate ratio is 4:1.[1085] They further assert that even a 4:1 ratio is conservative, as evidenced by the fact that Verizon's 1999 network planning guidelines assumed a higher line concentration ratio in evaluating the potential benefits of DLC systems that use the GR-303 switch interface standard.[1086] Further, AT&T claims that its competitive LEC facilities are engineered using NGDLC systems configured with line concentration ratios of higher than 3:1.[1087] WorldCom, however, notes that, to the extent that it uses NGDLC systems, it configures them with less than a 3:1 concentration ratio.[1088]

b. Discussion

425. As we explain at length in our loop analysis, we adopt AT&T/WorldCom's assumption that all fiber-fed loops use GR-303 NGDLC systems. We found there that: (1) GR-303 NGDLC systems are more advanced and efficient than TR-008 IDLC systems; (2) it is technically feasible to unbundle NGDLC loops; (3) Verizon fails to demonstrate that UDLC systems are necessary to provision special services; and (4) neither Verizon's OSS nor its security concerns undermine these conclusions.[1089] Because NGDLC loops enter the switch through a digital, rather than analog, port, we require Verizon to re-run its switching cost study assuming that all fiber-fed loops use GR-303-capable digital ports.

426. Because of the need for consistent assumptions for loop plant and switching, however, we do not adopt the 82:18 digital to analog port ratio proposed by AT&T/WorldCom. Instead, we require Verizon to re-run its cost model using the percentage of digital ports that the MSM calculates for NGDLC-based loops and the percentage of analog ports that the MSM calculates for all-copper loops. Specifically, Verizon shall use 78.9 percent digital ports and 21.1 percent analog ports in its cost study re-run.[1090] Use of these figures ensures consistent DLC technology assumptions between the loop cost study and the switching cost study.

[1085] AT&T/WorldCom Ex. 12P, at 104-07 (confidential version); AT&T/WorldCom Ex. 24, at 9-10.

[1086] AT&T/WorldCom Ex. 12P, at 31 (confidential version).

[1087] Letter from Mark Keffer, AT&T Chief Regulatory Counsel, Atlantic Region, to Magalie R. Salas, Secretary, Federal Communications Commission, CC Docket Nos. 00-218, 00-251, at response to record request no. 9 (requested Nov. 28, 2001) (filed Dec. 21, 2001) (confidential version) (Keffer Dec. 21 Letter) (The public version of this response was filed on Jan. 4, 2002. *See* Letter from Mark Keffer, AT&T Chief Regulatory Counsel, Atlantic Region, to Magalie R. Salas, Secretary, Federal Communications Commission, CC Docket Nos. 00-218, 00-251 (filed Jan. 4, 2002)).

[1088] WorldCom responses to record requests no. 2-4 (filed Jan. 18, 2002) (confidential version).

[1089] *See supra* section IV(C)(2)(k)(iii).

[1090] Of the 3,724,335 lines modeled by the MSM, 2,937,347, or 78.9 percent, use NGDLC systems. The remainder, or 21.1 percent, are all-copper loops.

427.   We also require Verizon to use its proposed 3:1 line concentration ratio for digital ports in its cost study re-run.[1091] Verizon asserts that line concentration is engineered as an inverse function of usage.[1092] Verizon's 3:1 line concentration assumption, which is based on the expertise of its network engineers,[1093] seems reasonable given that usage growth is exceeding line growth[1094] and actual NGDLC system deployment (including line concentration) is only beginning.[1095] Evidence introduced by AT&T/WorldCom shows that, depending on the application, line concentration ratios of both greater than or less than 3:1 may be appropriate,[1096] thus Verizon's proposal may assume either too much or too little concentration. The AT&T/WorldCom evidence, which is based in large part on the experiences of AT&T's and WorldCom's competitive LEC operations, does not undermine the reasonableness of Verizon's proposal for the purpose of setting UNE prices for Verizon's operations as an incumbent LEC in Virginia.

4.   Fill Factors

a.   Positions of the Parties

428.   As we explain *supra* in the loop section of this order, fill factors represent the percentage of total usable capacity of a facility that is expected to be used to meet a measure of demand.[1097] Verizon asserts, without further elaboration, that it bases its analog line port and digital trunk port fill factors on its "current operating objectives."[1098] It proposes a digital line port fill factor that is considerably lower than its analog line port fill factor because it claims that switch capacity is installed before RT capacity.[1099] To arrive at its proposed fill factors, Verizon first inputs an administrative fill factor into the SCIS model.[1100] The SCIS model accounts for

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[1091] This concentration ratio is specific to line concentration for the digital ports and is independent of the line concentration ratios that Verizon uses in the switches themselves.

[1092] *See* Verizon Ex. 107, at 183-185.

[1093] *See* Verizon Ex. 122, at 184-85; Verizon Switching Cost Brief at 14.

[1094] *See supra* section V(C)(1)(b)(ii)(b).

[1095] *See* Verizon Switching Cost Brief at 13 n.20.

[1096] *See* Keffer Dec. 21 Letter, at response to record request no. 9 (requested Nov. 28, 2001) (confidential version); WorldCom responses to record requests no. 2-4 (filed Jan. 18, 2002) (confidential version).

[1097] *See supra* section IV(C)(2)(g).

[1098] Verizon Ex. 107, at 195-96.

[1099] *Id.* at 195.

[1100] *Id.* at 196; *see also* Verizon Ex. 168 (Errata on Matt Supplemental Surrebuttal). Verizon uses different inputs for administrative fill for each of the different switching fill factors, *i.e.*, analog line ports, digital line ports, and digital trunk ports. *See* Verizon Ex. 168, at 1-3, 8.

breakage in its estimate of investment.[1101] Verizon then applies a utilization adjustment factor (UAF) to adjust the investment derived from the SCIS model to reflect its proposed fill factors.[1102] It develops the UAF by determining the fill reflected in the SCIS model investment and the percentage by which this investment must be increased to reflect its proposed fill factors.[1103]

429.   The UAFs that Verizon applies to the SCIS model investment are weighted averages of separate UAFs developed for different switch technologies (*i.e.*, Lucent 5ESS, Nortel DMS-100 and DMS-200, and Siemens EWSD switches).[1104] Verizon uses weighted average UAFs for trunk ports and line ports by weighting the UAFs for the different technologies by the average number of trunks per node and the average number of lines per node, respectively.[1105] These weighted average UAFs are applied to weighted average investments developed from the SCIS model for the same technologies.[1106] The weighted average end-office line port investment developed using the SCIS model is based on the number of lines on each type of switch.[1107] The weighted average end-office trunk port investment developed using the SCIS model also is based on the number of lines.[1108] The weighted average tandem office trunk port investment developed using the SCIS model is based on the number of tandem trunks.[1109]

430.   AT&T/WorldCom restate Verizon's switch cost study using only the fill factor

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[1101] *See* Verizon Ex. 107, at 197.

[1102] Verizon Ex. 122, at 186-88; *see also* Verizon Ex. 168.

[1103] *See* Verizon Ex. 122, at 186-88; Verizon Ex. 168.

[1104] *See* Verizon Ex. 168.

[1105] For example, Verizon calculates the weights for use in calculating the weighted average analog line port UAFs by dividing the average number of analog lines on Lucent 5ESS, Nortel DMS-100, and Siemens EWSD switches by the sum the averages. *See* Verizon Ex. 168, at 3.

[1106] More specifically, in the case of POTS and ISDN BRI line ports, the weighted average UAFs for analog line ports, GR-303 line ports, and TR-008 line ports are weighted by the percentage of the total POTS lines that are analog, GR-303, and TR-008 in the Verizon study, then this weighted average of the weighted averages is applied to POTS and ISDN PRI investment derived from the SCIS model. Verizon Ex. 168, at 5. In the case of dedicated IDLC line ports, the weighted average UAFs for GR-303 line ports and TR-008 line ports are weighted by the percentage of the total of these two lines that are GR-303 and TR-008 lines in the Verizon study, then this weighted average of the weighted averages is applied to IDLC investment derived from the SCIS model. *Id.*

[1107] Verizon Ex. 161P, CD-ROM "VZ-VA FCC ARB (Additional Cost Studies)," folder "VA EXCEL & WORD STUDIES," folder "VA SWITCHING SUPPORT FILES," folder "VA Unbundled Ports Support" (confidential version).

[1108] *Id.*

[1109] *Id.*

reflected in the investment that is derived from the SCIS model.[1110] They claim that these fill factors are sufficient and that the additional UAFs are unnecessary.[1111] In addition, they assert that, even if the UAFs are appropriate, Verizon improperly determined the UAF for digital trunk ports by including remote switches, which do not support trunks, in its UAF calculation for the *digital trunk port fill factor.*[1112]

431.   In an errata filing, Verizon recalculated its UAF for digital trunk ports excluding remote switches from its calculation.[1113]

b.   Discussion

432.   We adopt Verizon's proposed analog line port fill factor for both analog and digital ports and adopt Verizon's proposed trunk port fill factor. We depart slightly from baseball arbitration, however, in order to require Verizon to correct an error in its calculation of the digital trunk port UAF, as described below.

433.   We find that Verizon's proposed analog line port fill factor is reasonable. The proposed fill factor is consistent with, although slightly higher than, Verizon's actual analog line port utilization, and with the line port fill factor that AT&T/WorldCom propose to use in the MSM.[1114] Were we to assume only three to five percent excess line capacity on a switch for administrative, growth, breakage, churn, and capacity limits on busy hour usage, this would produce a fill factor of roughly between 75 and 85 percent, below that proposed by Verizon. In addition, AT&T/WorldCom fail to explain why the fill factor resulting from the SCIS model, exclusive of the UAF, is appropriate. Accordingly, because Verizon's experienced analog line port fill is substantially similar to the fill factor it proposes and because no other viable option was presented by the parties, we adopt Verizon's proposal.[1115]

434.   We find that none of the parties substantiates its proposed digital line port fill factor. Although Verizon proposes a digital line port fill factor that is less than its analog line port fill factor, it fails to introduce any evidence substantiating this figure. Verizon provided its actual analog port utilization, but it failed to provide its actual fill for digital line ports. Although Verizon argues that switch capacity is installed before RT capacity, and that, therefore,

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[1110] AT&T/WorldCom Ex. 24, at 13-14.

[1111] *Id.*

[1112] *Id.* at 13.

[1113] *See* Verizon Ex. 168.

[1114] Verizon Ex. 107, at 196; AT&T/WorldCom Ex. 23, CD-ROM file "VA_C and P Tel Co of VA_VA Direct Filing_WC," worksheet "User Adjustable Inputs," at cell J13.

[1115] Specifically, in its compliance filing, we direct Verizon to use the analog line port fill factor identified on page 195 of its initial cost panel testimony. *See* Verizon Ex. 107P, at 196 (confidential version).

utilization of switch digital line ports is lower than utilization of lines at the DLC RT,[1116] it fails to submit any evidence regarding the degree to which the digital line port fill is lower than the analog port fill. Nor does it provide any evidence of the relative difference between the digital and analog line port fill factor levels. AT&T/WorldCom similarly fail to support their proposal to exclude the UAF from the fill factor. Consequently, in the absence of evidence supporting the use of a different fill factor for digital lines, we adopt Verizon's proposed analog port fill factor as the digital line port fill factor.[1117]

435.   We adopt Verizon's proposed digital trunk port fill factor because it is nearly identical to the only relevant record evidence on this point, the digital trunk port fill that Verizon has experienced. AT&T/WorldCom offer no evidence that this fill level is inefficient. We also note that Verizon addressed AT&T/WorldCom's concern that the UAF calculation for digital trunk ports erroneously included remote switches, thus mooting this concern.[1118]

436.   In analyzing AT&T/WorldCom's allegation that Verizon miscalculated the digital trunk port UAF and Verizon's response thereto, we have identified an error in the UAF calculation that we require Verizon to correct.[1119] Specifically, Verizon uses incorrect weights to calculate this UAF. The weights Verizon uses to develop the separate weighted average UAFs for digital trunks and digital and analog lines imply a different mix of lines and trunks on 5ESS, DMS-100, DMS-200, and EWSD switches than Verizon uses to develop investment using the SCIS model.[1120] The purpose of weighted averages is to reflect the characteristics of the switches for which costs are being developed. To accomplish this and maintain logical consistency, the weights reflected in the weighted average UAF factors and the weighted average investment must be the same. We therefore require Verizon to develop the separate weighted average UAFs for digital trunks and digital and analog lines based on the mix of lines and trunks on 5ESS, DMS-100, DMS-200, and EWSD switches Verizon is required to use to develop investment using the SCIS model in its compliance filing.

5.   Trunk Utilization Level

a.   Positions of the Parties

437.   In addition to using fill factors in its switching cost calculations, Verizon includes

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[1116] Verizon Ex. 107, at 195.

[1117] Specifically, in its compliance filing, we direct Verizon to use the analog line port fill factor identified on page 196 of its initial cost panel testimony as the digital line port fill factor. *See* Verizon Ex. 107P, at 196 (confidential version).

[1118] Specifically, in its compliance filing, we direct Verizon to use the digital trunk port fill factor identified on page 196 of its initial cost panel testimony. *See id.*

[1119] This error applies to all of Verizon's UAF calculations, not just its digital trunk port UAF calculation.

[1120] *See* Verizon Ex. 125P, Attach. A (confidential version); Verizon Ex. 168, at 3, 10.

assumptions on busy hour utilization levels in its cost studies. Busy hour utilization refers to the amount of peak-period traffic carried on an individual trunk. Verizon develops a busy hour utilization number for each switch in its switching studies.[1121] These numbers are measured in CCS per trunk.

438. AT&T/WorldCom assert that Verizon's assumed CCS busy hour utilization levels for end-office and tandem trunk ports are too low.[1122] They claim that Verizon confirmed its underutilization of trunks in a discovery response in which Verizon states that it assumed that traffic on tandem trunks associated with two switches excluded from its cost study is carried via existing direct trunks or by other tandem trunks included in the study.[1123] AT&T/WorldCom also argue that Verizon's assumed busy hour trunk utilization levels are inappropriately low because they are substantially below the maximum reasonable utilization assumed in the SCIS model.[1124]

b. Discussion

439. We find Verizon's busy hour trunk utilization levels to be reasonable.[1125] We disagree with AT&T/WorldCom's contention that Verizon effectively conceded in discovery that its utilization level is too low. First, AT&T/WorldCom place undue weight on the treatment of traffic carried on the excluded trunks, which represent only a very small percentage of the total tandem trunks and end-office trunks in the Verizon studies.[1126] Second, to the extent that Verizon assumes that traffic on the excluded trunks is absorbed by other existing trunks, the utilization of the existing trunks reflected in its cost study is higher than it otherwise would be.

440. We also disagree with AT&T/WorldCom's assertion that Verizon's use of trunk port utilizations below the maximum utilization means that trunk utilization is too low. Although AT&T/WorldCom may be correct that the busy hour utilizations used in the Verizon

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[1121] Verizon Ex. 125P, Attach. B1-B4 (confidential version); Verizon Ex. 161, Attach. H.

[1122] AT&T/WorldCom Ex. 24, at 14.

[1123] *Id.*

[1124] *Id.*

[1125] To the extent that Verizon revises its trunk utilizations due to the other changes that we require Verizon to make to its switching cost studies in its compliance filing, we do not expect such changes to result in lower utilizations than those reflected in Verizon's current switching studies. We therefore direct Verizon to document and explain in its compliance filing the basis for any decrease in utilization levels.

[1126] There are fewer than 10,000 tandem trunks connected to the excluded switches. Verizon assumes that the traffic on these trunks would be handled by direct trunks or by other tandem trunks. AT&T/WorldCom Ex. 24, at 14. In Verizon's cost study, the number of tandem trunks is substantially more than an order of magnitude greater than 10,000, and the number of end-office trunks is considerably greater still. *See* Verizon Ex. 125P, Attach. D (confidential version); Verizon Ex. 161, Attach. H. Thus, the excluded trunks therefore represent a minimal percentage of either the total tandem or the total end-office trunks, even after adjusting the total trunk figures downward to make the excluded and the total trunk numbers comparable.

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cost study are below the SCIS model's maximum reasonable utilization,[1127] the maximum level represents the highest, but not the only, or even the most, reasonable level. AT&T/WorldCom, moreover, fail to identify any alternative busy hour CCS per trunk utilization assumptions for use in the SCIS model. Indeed, in their restatement of the Verizon switching cost studies, they use the same busy hour CCS per trunk assumptions that Verizon uses.[1128] AT&T/WorldCom also fail to submit any engineering formulas, tables, or studies to support use of a higher CCS per trunk utilization.

6.   EF&I Factor

a.   Positions of the Parties

441.   The switching EF&I factor represents the ratio of total installed digital switch investment, including investment for material, engineering, furnishing, and installing of a switch, to the material-only investment.[1129] In the Verizon switching cost study, the EF&I factor is applied to forward-looking investment to estimate forward-looking total installed investment.[1130] The EF&I factor is therefore large if the switching vendor discount is large and the discount applies only to material costs.

442.   Verizon proposes an EF&I factor based on 1998 investment data for the Verizon-East footprint.[1131] Because Verizon installed a relatively small number of switches in the Verizon-East footprint in 1998,[1132] its proposed EF&I factor reflects a correspondingly large fraction of growth and upgrade investment on which Verizon receives a relatively small discount.[1133] Verizon also showed that, had it based its EF&I factor solely on the new switches

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[1127] Verizon Ex. 125P, Attach. H (confidential version); Verizon Ex. 161P, Attach. D (confidential version).

[1128] AT&T/WorldCom Ex. 24P, Workpapers (CD-ROM), folder "VA REC&SWITCH," file "Switch Backup," worksheets "EO MOU," "Tdm MOU" (confidential version). We also note that the input value used by AT&T/WorldCom in the MSM for the maximum CCS per trunk utilization is 27.5 CCS per trunk, a value that is considerably lower than maximum value assumed by the SCIS model and that is not inconsistent with the weighted average end-office trunk utilization in Verizon's study. *See* AT&T/WorldCom Ex. 23, CD-ROM file "VA_C and P Tel Co of VA_VA Direct Filing_WC," worksheet "User Adjustable Inputs," at cell J13.

[1129] Verizon Ex. 122, at 201.

[1130] *Id.*

[1131] Verizon Ex. 100P, Vol. XII, Part G-4b at 8 (confidential version); Verizon Ex. 122, at 201.

[1132] Verizon Ex. 219P (Verizon proprietary response to record request no. 35 (requested Nov. 28, 2001)) (confidential version).

[1133] We determined this by examining the number of new switches Verizon-East installed in 1998 and its total material only switch investment for that year. Verizon Ex. 100P, Vol. XII, Part G-4b-VA 2000 Investment Loading Factors.xls, WP_Pg8 (confidential version); Verizon Ex. 219P (confidential version). We then looked at Verizon-East's switch purchases in 2000, for which Verizon provided the purchase price. Verizon Ex. 224 (Verizon response to record request no. 40 (requested Nov. 29, 2001)). Taking the material only price for the most expensive (continued....)

that it installed in 2000 and for which Verizon received a relatively large vendor discount, the factor would have been approximately 58 percent higher than Verizon's actual proposed EF&I factor.[1134]

443.   AT&T/WorldCom propose an EF&I factor of 1.27 for Verizon's switching cost study.[1135] Their proposed factor is based on: (1) vendor EF&I investments obtained by running the SCIS model; (2) a telephone company only (*i.e.*, excluding vendor EF&I) EF&I factor developed by Verizon for a 1992 Commission proceeding concerning Open Network Architecture elements; and (3) Virginia sales tax.[1136]

b.   Discussion

444.   We adopt Verizon's proposed switching EF&I factor.[1137] As we explain above, the vendor discount used to estimate the switch investment to which the EF&I factor applies will be based largely on the new switch discount.[1138] Because the Verizon EF&I factor reflects a relatively large percent of growth and upgrade jobs for which Verizon receives a relatively small discount, but will be applied in the cost study to investments that reflect mostly the relatively large discount Verizon receives for new switches, this factor may be conservative. For example, if Verizon's new year 2000 switches were used to determine the EF&I factor, the factor would be considerably higher. The Verizon factor is preferable, moreover, because it relies on 1998 data, rather than on (in substantial part) decade-old data as AT&T/WorldCom propose. Data of more recent vintage are more appropriate for a forward-looking cost calculation than decade-old data.

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switch Verizon-East purchased in 2000 (which is more than three times as large as the average Verizon (Virginia) switch) and multiplying it by the number of switches that Verizon-East installed in 1998 results in a value that is approximately 17 percent of total Verizon-East digital switch investment (material only) for 1998. *See* Verizon Ex. 226P (confidential version). If we start instead with a price twice as high as the most expensive switch Verizon-East purchased in 2000, and multiply it by the number of switches Verizon-East installed in 1998, the result is a value that is only 34 percent of total Verizon-East digital switch investment (material only) for 1998. Thus, even by these conservative measures, it is evident that Verizon-East's switch investment reflects a relatively large proportion of growth and upgrade purchases.

[1134] Verizon Ex. 224.

[1135] AT&T/WorldCom Ex. 12, Attach. 7.

[1136] AT&T/WorldCom Ex. 12, at 120-21, Attach. 2, 7.

[1137] We direct Verizon to use in its compliance filing the EF&I factor identified on page 8, line 7, of its switching investment loading studies. *See* Verizon Ex. 100P, Vol. XII, Part G-4b at 8 (confidential version).

[1138] *See supra* section V(C)(1)(b).

7. Right-To-Use Fees

a. Positions of the Parties

445. RTU fees are charges paid by a carrier to a switch vendor for software.[1139] RTU fees for a new switch and for upgrades and growth additions are among the long-run costs that an efficient carrier would incur; therefore, they may be reflected in unbundled switching prices. Verizon developed a RTU factor based on Verizon East's actual software expenditures in 1999 and 2000 and Verizon-East's forecasted software expenditures for 2001 and 2002.[1140] Verizon explains that in 1999 an accounting change required carriers to capitalize, rather than to expense, RTU fees.[1141] Verizon further explains that RTU expenditures that in the past had been spread over several years were "brought into" 1999.[1142]

446. AT&T/WorldCom contend that the 1999 expenditures, which are more than twice as high as those in any other year,[1143] are artificially high due to the accounting change and therefore should be excluded from Verizon's calculations of the RTU fees.[1144]

447. Verizon also claims that, if we require it to assume a higher percentage of new switches in its cost study than it proposes, then its proposed RTU fee would be too low because it primarily reflects expenditures on software for existing switches rather than new switches. In 1999 and 2000, Verizon installed a relatively small number of new switches, and it claims it is unlikely to install many digital switches going forward.[1145] Verizon claims that the amount of RTU-fees it proposes to recover is conservative because the up-front payment for new switch RTU fees is approximately $2 million per switch.[1146] To support this latter claim, Verizon relies on an AT&T-Lucent switch contract.[1147] Assuming a 12.95 percent cost of capital and a 12-year switch life, a per switch $2 million up-front payment is equivalent to equal annual payments of

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[1139] Verizon Ex. 107, at 203.

[1140] Verizon Ex. 100P, Vol. XII, Part G-9, VA RTU Factor Study, WP1_Pg1 (confidential version).

[1141] Tr. at 5438-39.

[1142] *Id.*

[1143] *See* Verizon Ex. 100P, Vol. XII, Part G-9, VA RTU Factor Study, WP1_Pg1 (confidential version).

[1144] AT&T/WorldCom Switching Cost Brief at 22-23.

[1145] *See* Verizon Ex. 219P (confidential version).

[1146] *See* Verizon Ex. 122 at 198-99. Because Verizon did not include a revised per switch per year RTU figure in its revised cost study, we calculated this amount based on Verizon's methodology in its earlier filing. *See id.*, Attach: S.

[1147] *Id.* at 198-99, Attach. A.

approximately $337,211 per switch, an amount several times greater than Verizon's proposal.[1148]

b.   Discussion

448.   We agree with AT&T/WorldCom and therefore require Verizon to recalculate its RTU fee excluding the 1999 data. The 1999 data appear anomalous, and Verizon fails to demonstrate that the claimed 1999 fees represent actual cash expenditures solely related to software purchased in that year. We also reject as unsupported by the evidence Verizon's contention that its RTU fee is conservative because new switch up-front RTU fees may be as high as $2 million per new switch.

449.   Verizon fails to address the fundamental question why 1999 expenditures are so much higher than its actual 2000 expenditures and its 2001 and 2002 forecasted expenditures. It offers no rationale explaining whether and for what reasons RTU fees might be sharply higher in a given year, as compared to other years, or otherwise exhibit some pattern that includes such spikes. Nor did Verizon provide any evidence that expenditures during any year for which the rates are set in this proceeding would even approach the 1999 level. The RTU factor and the rates reflecting this factor established for the rate period should reflect the level of expenditures expected during the rate period. Accordingly, we require Verizon to exclude the 1999 data.

450.   We also reject Verizon's claim that its proposed factor is conservative because this claim is not supported by relevant evidence. Verizon's only support for this assertion is its characterization of an AT&T contract with Lucent.[1149] We decline to rely on this contract for several reasons. AT&T's contract reflects the bargaining ability of AT&T, and Verizon likely has a different, perhaps greater, ability. The RTU fee in the AT&T contract also reflects the likely give-and-take inherent in most contract negotiations, and it is not clear what AT&T received in exchange for any concession it might have made relative to RTU fees. Nor is it clear whether what AT&T received as part of the bargain would be of similar value to Verizon. Thus, inferring what Verizon pays for new switch RTU fees based on the AT&T/Lucent contract is inappropriate unless all of the rates, terms, and conditions in the AT&T/Lucent contract are similar to those in a Verizon/Lucent contract (evidence of which is not in the record). In addition, we note that Verizon did not introduce into evidence any of its contracts with Lucent, nor did it propose a RTU fee for new switches based on any of its own data, either of which would seem more probative than the AT&T/Lucent contract. Therefore, Verizon's reliance on the AT&T/Lucent contract fails to demonstrate that its proposed RTU fee is reasonable.

451.   Accordingly, based on the record before us, we require Verizon to recalculate its RTU fees in its compliance filing based on its 2000-2002 data, excluding its 1999 data, as proposed by AT&T/WorldCom. In addition, consistent with the discussion in section III(E)(3), *supra*, Verizon should exclude from its calculations its proposed forward-looking conversion

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[1148] *See supra* sections III(C)(3)(d), III(D)(3).

[1149] Verizon Ex. 122, at 198-99, Attach. A.

factor.

8.   Busy Hour to Annual MOU Ratio

a.   Positions of the Parties

452.   Verizon uses a busy hour to annual MOU ratio (BHAR) to estimate the number of minutes over which to spread its estimate of the usage sensitive switching costs.[1150] Verizon uses the same BHAR to calculate both end-office and tandem switching costs.[1151] It multiplies its estimate of per busy hour capacity MOU[1152] switching costs[1153] by the BHAR to determine per all hour of the day MOU switching costs.[1154] The BHAR equals the busy hour to busy day MOU ratio (BHTD) divided by the number of equivalent busy days in a year.[1155] The BHTD is the fraction of busy day MOU that is in a busy day hour.[1156] Verizon adjusts the tandem switching costs per capacity MOU to reflect billable MOU in its study by multiplying these costs by the ratio of its estimate of total conversation and non-conversation MOU to its estimate of conversation MOU.[1157]

453.   WorldCom asserts that Verizon's MOU calculations, and by implication its BHAR, are flawed.[1158] Because WorldCom proposes recovery of end-office switching costs through a flat rate rather than an MOU charge, it claims that the complexities of this issue need

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[1150] Verizon Ex. 107, at 199, 201, 207-08.

[1151] *Id.*

[1152] Capacity MOU reflects the total time the switch is in use. These MOU include those for conversation time, *i.e.*, the time that a switch is in use while subscribers are talking to each other, and non-conversation time, *i.e.*, the time required for dialing, ringing, call set-up, and the time associated with calls that are not completed. Non-conversation times are not measured by the switch's billing recordings and therefore cannot be billed. Verizon adjusts the tandem switching costs per capacity MOU to reflect billable MOU in its study. *Id.* at 202, 207-08.

[1153] Verizon develops per busy hour MOU switching costs as follows: It first uses the SCIS model to develop switching investment. It then divides investment by busy hour capacity MOU. Next, Verizon converts the resulting investment per busy hour capacity MOU to total switching costs per busy hour capacity MOU by applying ACFs and investment loading factors. *Id.* at 199-201, 207-08.

[1154] *Id.* at 201, 207-08.

[1155] Verizon Ex. 100P, Vol. VI, Part C-8-1, Busy Hour to Annual Ratio – Back-Up (confidential version).

[1156] *Id;* Verizon Ex. 223 (Verizon response to record request no. 39 (requested Nov. 29, 2001)).

[1157] Verizon Ex. 107, at 207-08; Verizon Ex. 161P, CD-ROM "VZ-VA FCC ARB (Additional Cost Studies)," folder "VA UNBUNDLED REC&SWITCH," file "Back-up_VA MOUR_10_31 Part C-8," worksheets "Inputs," cell L17, and "NCT ADJ" (confidential version).

[1158] *See* WorldCom Ex. 6 (Goldfarb Direct), at 6.

not be resolved if that proposal is adopted.[1159]

b. Discussion

454. We agree with WorldCom that Verizon's proposed BHAR for end-office and tandem switching is flawed. As explained above, the BHAR calculation first requires that Verizon determine the busy day MOU and the number of equivalent busy days in a year. Based on our analysis of the Verizon switching cost studies, we have been unable to verify how Verizon calculated either of these inputs. Therefore, we do not know either the usage characteristics of the busy days that Verizon sampled or how those days compare to an average day. Verizon's failure to clearly document this information renders us unable to determine whether its switching cost study complies with TELRIC principles. In particular, we are unable to determine whether Verizon spreads its switching costs over an appropriate number of days.[1160]

455. We find it unnecessary to correct Verizon's BHAR with regard to end-office switching costs because we agree with WorldCom and find that all end-office switching costs must be recovered through flat-rated port charges, rather than per minute charges. Correcting Verizon's BHAR, therefore, arises only with respect to tandem switching costs, which are recovered through per minute charges.[1161]

456. To test the reasonableness of Verizon's annual MOU estimate, we examined DEM data published in ARMIS.[1162] Although the percentage of total DEMs that are tandem switching DEMs is not reported in ARMIS, we used the data in Verizon's cost studies to determine the percentage of Verizon's tandem busy hour MOU relative to its end-office busy hour MOU. We then applied this percentage to the total reported DEMs from ARMIS to produce an estimate of 2001 tandem switching DEMs. DEMs are billable MOU for Verizon.[1163] Therefore, we

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[1159] *See id.* at 6-7.

[1160] We note that, in reviewing Verizon-New Jersey's section 271 application, the Commission observed that the number of days that Verizon-New Jersey used in its BHAR "raise[d] serious questions," but it did not resolve this issue because it found that Verizon-New Jersey's non-loop rates were TELRIC-compliant based on a benchmark comparison to New York rates. *Application by Verizon New Jersey, Inc., Bell Atlantic Communications, Inc. (d/b/a Verizon Long Distance), NYNEX Long Distance Company (d/b/a Verizon Enterprise Solutions), Verizon Global Networks Inc., and Verizon Select Services Inc., for Authorization to Provide In-Region InterLATA Services in New Jersey*, WC Docket No. 02-67, Memorandum Opinion and Order, 17 FCC Rcd 12275, 12295, para. 48 (2002) (*New Jersey 271 Order*); *see also Application by Verizon New England., Verizon Delaware Inc., Bell Atlantic Communications, Inc. (d/b/a Verizon Long Distance), NYNEX Long Distance Company (d/b/a Verizon Enterprise Solutions), Verizon Global Networks Inc., and Verizon Select Services Inc., for Authorization To Provide In-Region, InterLATA Services in New Hampshire and Delaware*, 17 FCC Rcd 18660, 18683, 18703, paras. 37, 70 n.248.

[1161] *See infra* section V(D).

[1162] *See* ARMIS Report No. 43-04: Table I, Separations and Access Table.

[1163] DEMs reflect conversation and non-conversation MOU. There is one originating DEM and one terminating DEM, *i.e.*, two DEMs, associated with each conversation MOU. *See* 47 C.F.R. § 36.125(a)(3) and Glossary. (continued....)

compared the 2001 tandem switching DEMs that we calculated against the billable MOU estimate in Verizon's cost study. This comparison shows that Verizon's billable MOU estimate in its tandem switching study is approximately twenty-four percent lower than the 2001 DEMs estimate for tandem switching.[1164] Accordingly, we find Verizon's number of equivalent annual busy days in the BHAR, and therefore the BHAR, unreasonable.

457. Because we find that Verizon's BHAR calculation is unreasonable, but neither AT&T nor WorldCom proposed an alternative calculation, we depart from baseball arbitration and require Verizon to use 339 days as the number of equivalent annual busy days in the BHAR. Verizon's proposed tandem switching rate is an average rate that effectively spreads expected costs for the study period (2001-2003) over expected demand at the mid-point of this three-year period.[1165] As we explain above, based on ARMIS DEM data and the tandem to end-office switch busy hour MOU ratio reflected in Verizon's switching cost studies, we calculated the 2001 tandem switching DEMs for Verizon. Spreading Verizon's tandem switching costs over these DEMs, which we adjust to account for our tandem switch MOU growth rate, and accepting Verizon's proposed BHTD, requires that the BHAR be based on 339 equivalent busy days. We thus direct Verizon to use in its compliance filing 339 equivalent busy days in its BHAR calculation.[1166]

D. Rate Structure

1. Background

458. The Commission's general rate structure rules specify that UNE rates be structured consistently with the manner in which the costs of providing them are incurred.[1167] In other words, the basis on which the element is sold to the competitive LEC should reflect the basis on which the cost is incurred by the incumbent LEC. If, for example, the incumbent LEC were to pay the switch manufacturer a per line fee for some of the switch hardware or software,

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Verizon proposes applying an originating switching rate and a terminating switching rate to both intra-switch and inter-switch calls. Verizon Ex. 107, at 201. DEMs are therefore billable MOU for Verizon.

[1164] The billable MOU are lower than the 2001 DEMs even though Verizon assumed an annual tandem switching MOU growth rate between 2001 and 2003. *See* Verizon Ex. 161P, Attach. H, CD-ROM "VZ-VA FCC ARB (Additional Cost Studies)," folder "VA UNBUNDLED REC&SWITCH," file "Back-Up_VAMOUR_10_31 Part C-8," worksheet "Tdm MOU" (confidential version).

[1165] Verizon Ex. 107, at 200-01, 207-08; Verizon Ex. 161P, CD-ROM "VZ-VA FCC ARB (Additional Cost Studies)," folder "VA EXCEL & WORD STUDIES," folder "VA SWITCHING SUPPORT FILES," folder "VA UNBUNDLED REC&SWITCH," file "VAMOURRECIPCOMP0_3101," worksheet "Assumptions," cell B17 (confidential version). The mid-point for this three-year period is June 30, 2002.

[1166] We also direct Verizon to use in its compliance filing the same BHTD that it used in its original cost study filing. *See* Verizon Ex. 100P, Vol. VI, Part C-8-1, Busy Hour to Annual Ratio – Back-Up (confidential version).

[1167] 47 C.F.R. § 51.507(a); *Local Competition First Report and Order*, 11 FCC Rcd at 15874, para. 743.

then the incumbent LEC should recover these switch costs from the competitive LEC on the same basis. If the incumbent LEC were to recover these costs on a per MOU basis, then this would provide the competitive LEC's subscribers with an uneconomic incentive to reduce usage of this switch hardware or software.

459. The Commission's general rate structure rules also specify that the costs of shared facilities should be recovered in a manner that efficiently apportions them among users, either through usage-sensitive charges or capacity-based flat-rated charges.[1168] That is, these costs should be allocated among subscribers on the basis of their causal responsibilities. The Commission's specific rate structure rule for local switching specifies that costs for this element be recovered through a combination of a flat-rated charge for line ports and one or more flat-rated or per MOU charges for the switching matrix and trunk ports, but it does not specify a particular combination or means for determining the appropriate combination.[1169]

2. Positions of the Parties

460. Verizon proposes to recover the non-traffic-sensitive costs of the switch through a per port charge and the traffic-sensitive costs through a per MOU charge.[1170] According to Verizon, usage affects the costs of providing many of the services associated with switching and thus should be reflected in the rate structure. Verizon states that, when assessing the network demand and purchasing switches and switch upgrades, it is required to forecast switch usage and purchase sufficient capacity to accommodate that usage.[1171] Verizon proposes to recover the following costs on a per MOU basis: "getting started" costs, EPHC costs, RTU software costs, and "shared peak-period costs."[1172]

[1168] 47 C.F.R. § 51.507(c); *Local Competition First Report and Order*, 11 FCC Rcd at 15874, para. 755.

[1169] 47 C.F.R. § 51.509(b); *Local Competition First Report and Order*, 11 FCC Rcd at 15874, para. 757. In reviewing section 271 applications, the Commission has rejected arguments that the TELRIC pricing rules require that at least a certain percentage of shared switching costs must be recovered through flat-rated charges. *See, e.g., Application of Qwest Communications International, Inc. for Authorization to Provide In-Region InterLATA Services in the States of Colorado, Idaho, Iowa, Montana, Nebraska, North Dakota, Utah, Washington, and Wyoming*, WC Docket No. 02-314, Memorandum Opinion and Order, 17 FCC Rcd 26303, 26422, para. 209 (2002) (*Qwest Multistate 271 Order*). In the section 271 context, however, the Commission does not engage in a *de novo* review of a state commission's decision. Rather, the Commission simply determines whether the end result is within the range of rates that a reasonable application of TELRIC principles would produce. As noted above, the Commission's rules give state commissions flexibility to permit recovery of switching matrix and trunk port costs through "one or more flat-rated *or* per minute usage charges." 47 C.F.R. § 51.509(b) (emphasis added).

[1170] Verizon Ex. 115 (West Rebuttal), at 2-3.

[1171] Verizon Ex. 109, at 52-54.

[1172] Verizon Ex. 122, at 191. Shared peak-period costs include non-ISDN line CCS and ISDN CCS, D channel access PPS, PPB channel access PPS, inter-switch PPS, and SS7 link and trunk CCS. AT&T/WorldCom Ex. 12, at 109.

461.   AT&T/WorldCom assert that much of the total cost of a switch is associated with memory and processors and is incurred at the time a switch is placed in operation.[1173] According to AT&T/WorldCom, these "getting started" costs do not vary with usage.[1174] They further assert that the majority of the costs of today's generation of digital switches is driven by ports, rather than usage, and only a very small percentage of the overall equipment in current digital switches is engineered based on peak-period usage.[1175] According to AT&T/WorldCom, based on actual Verizon total switch costs, most costs are non-usage sensitive and should be allocated to the port rather than MOU rate elements.

462.   AT&T and WorldCom diverge slightly with regard to the precise allocation between usage and non-usage sensitive rate elements. AT&T recommends that Verizon continue to assess switching charges using the rate design currently in place, *i.e.*, a separate fixed monthly port charge to recover the non-usage sensitive switch costs as well as a per MOU charge to recover the usage sensitive costs.[1176] Specifically, AT&T agrees with Verizon that shared, peak-period costs should be recovered on a usage sensitive basis.[1177] WorldCom argues that all costs, even the shared, peak-period costs, should be recovered through a flat-rated port charge.[1178]

3.   Discussion

a.   "Getting Started" Costs

463.   We conclude above, for purposes of determining the appropriate switch discount, that the "getting started" cost of the switch is a fixed cost, meaning that it does not vary with the number of ports or the level of usage on the switch.[1179] We find here that the "getting started" costs of the switch should be recovered on a per line port basis. "Getting started" costs are incurred for capacity that is shared among subscribers. Verizon incurs these costs to be ready to provide service upon demand. Given the record evidence that modern switches typically have large amounts of excess central processor and memory capacity,[1180] the usage by any one subscriber or group of subscribers is not expected to press so hard on processor or memory capacity at any one time as to cause call blockage, or a need for additional capacity to avoid such

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[1173] AT&T/WorldCom Ex. 4, at 7.

[1174] *Id.*

[1175] *Id.*

[1176] AT&T Ex. 4 (Kirchberger Direct), at 13-14.

[1177] *Id.*

[1178] WorldCom Ex. 6, at 7.

[1179] *See supra* section V(C)(1)(b)(i).

[1180] *See supra* para. 391.

blockage. Thus, no one subscriber or group of subscribers is any more or any less causally responsible for the processor or memory capacity costs. Principles of cost causation, therefore, support a per line port cost recovery approach because, more than any other approach, it spreads getting started costs to carriers in a manner that treats equally all subscribers served by a switch.

464. In addition, charging a per line port price for the central processor and memory recovers these costs from competitive LECs on a competitively neutral basis, thereby potentially extending to many different subscribers the benefits of competition. The incumbent LEC incurs central processor and memory costs in order to provide service to all of the subscribers served by the switch's line ports. A competitive LEC may serve some of these subscribers and the incumbent LEC may serve some of these subscribers. The incumbent LEC's central processor and memory costs do not vary with respect to whether a subscriber connected to its switch is a high or low volume user, a residential or business user, or a peak-period or off-peak-period user. A competitive LEC faces no advantage or disadvantage in competing against the incumbent LEC if it pays for use of the central processor and memory on a per line port basis. If the incumbent LEC chooses to recover relatively more or less of the central processor and memory cost from high volume business users or low volume residential users, for example, the competitive LEC is able to compete with the incumbent LEC (or another competitive LEC) by doing the same.

465. A per MOU price for the central processor and memory, in contrast to a per line port price, would not recover these costs on a competitively neutral basis. Again, the incumbent LEC's central processor and memory costs do not vary with respect to whether a subscriber connected to its switch is a high or low volume user, a residential or business user, or a peak-period or off-peak-period user. A competitive LEC suffers a competitive disadvantage for high volume users relative to the incumbent LEC if the incumbent LEC recovers central processor and memory costs from the competitive LEC on a per MOU basis. The competitive LEC would pay more to serve the high volume users, while the incumbent LEC could recover the central processor and memory costs, which do not vary with usage, on a per line basis from all of its subscribers, including high volume users. Principles of cost causation do not, therefore, support a per MOU price, because it would recover proportionately more of the "getting started" costs from high usage subscribers than from low usage subscribers.

466. We disagree with Verizon's argument that it "grows" or replaces virtually all of the components of a switch over its life and that, therefore, costs for the central processor are usage sensitive and should be recovered on a per MOU basis.[1181] Verizon fails to show that it would expect to replace the central processor of a modern switch for the specific reason that usage increases over the life of the switch. It identifies three reasons why the processor would be replaced. First, manufacturers continuously upgrade switch software to improve the operational and administrative efficiency of the switch.[1182] These software upgrades at some point require an upgrade to the processor. Second, software is added frequently over time to add

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[1181] Verizon Ex. 123, at 6-12.

[1182] Tr. at 5435.

the capability to provide new vertical features as they are developed or to accommodate new regulatory mandates such as number portability.[1183] The software added to the switches over time for these reasons at some point requires a processor upgrade. Third, an increase in subscriber usage per line or the number of lines connected to the switch may increase to the point at which the processor must be augmented.[1184]

467. The first two reasons for replacing or upgrading the processor relate to obsolescence, not to the level of subscriber usage over time. Switch obsolescence is accounted for in the useful life of the switch prescribed for estimating the depreciation expense recovered in the switch prices. Showing that the central processor may be replaced due to obsolescence does not demonstrate that processor capacity costs are usage sensitive or should be recovered on that basis. We note that for purposes of determining depreciation expense we have adopted an asset life at the low end of the Commission's safe harbor range: 12 years.[1185] We believe that this relatively short switch life is adequate to reflect the need to upgrade the processor for reasons of obsolescence.[1186]

468. With respect to the frequency with which Verizon would expect to augment the central processor or memory of the switch as usage increases, the only evidence adduced is that processor switch blocking occurred in New Hampshire.[1187] Verizon did not indicate, however, how many switches or subscribers connected to these switches experience blocking, or even whether these switches were modern digital switches. Instead, most of the written and oral testimony and evidence supplied by Verizon and AT&T/WorldCom, as discussed above, indicates that the central processor and memory of a modern switch installed today are unlikely to exhaust as a result of increased subscriber usage.[1188]

b. EPHC Costs

469. EPHC costs relate only to the Lucent 5ESS switch.[1189] The 5ESS switch is based

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[1183] *Id.*

[1184] *Id.* at 5435-36.

[1185] *See infra* section III(D).

[1186] The useful life for estimating depreciating expense reflects the average life of the various components of a switch. There is no separate useful life for each separate component of the switch, such as the central processor.

[1187] Tr. at 5448.

[1188] Verizon also provided in its surrebuttal testimony examples of various "getting started" components of the switch that it has grown or replaced. Verizon Ex. 122, at 176-78. Verizon explains that the majority of these components were upgrades developed by the switch manufacturer. Again, the fact that Verizon upgrades the "getting started" equipment does not demonstrate that these costs are incurred as a result of increases in subscriber usage. As we discuss above, moreover, Verizon does not provide empirical evidence to quantify the extent to which it has grown or replaced the "getting started" components of the switch. *See supra* section V(C)(1)(b)(i).

[1189] Verizon Ex. 123, at 10. EPHC stands for "equivalent POTS half call."

on a distributed processor architecture. The primary building block of the Lucent 5ESS distributed processor architecture is the switching module.[1190] The common equipment of the switching module consists of a processor complex and equipment designed to terminate line interface and trunk interface equipment.[1191] These common equipment costs are referred to as EPHC costs in the SCIS model output work papers.

470.   The parties agree that in general port capacity is reached before processor capacity in the Lucent 5ESS switch modules.[1192] The SCIS model user guide indicates that the switch modules in the Lucent 5ESS switch by design have excess call capacity and that they therefore are expected to be port limited rather than terminal limited.[1193] AT&T/WorldCom argue that there is excess call capacity for every switch in the Verizon switch cost study.[1194] When the number of ports on the switch module reaches capacity, a new switch module is purchased. That is, according to AT&T/WorldCom, the port capacity exhausts before the call capacity of these modules. Verizon states that Lucent has evolved the processor capacities of these modules to stay one step ahead of call volume demand, thereby enabling the modules to avoid processor exhaust.[1195] It did claim, however, that there are circumstances where the processor capacity is reached before the port capacity of the module.[1196]

471.   We conclude that EPHC costs should be recovered on a per line port basis. EPHC costs, like "getting started" costs, are incurred for capacity that is shared among subscribers. Verizon incurs these costs to be ready to provide service upon demand. The balance of the record evidence supports a finding that the Lucent 5ESS switch module costs do not vary with respect to usage. Verizon states that there are circumstances when the processor capacity of the module may be increased before its port capacity is reached, or when port demand is limited in order to avoid processor exhaust, thereby suggesting that the EPHC costs vary with usage.[1197] It did not quantify the frequency with which this occurs, however, nor did it provide any other details regarding these situations. Absent such evidence, we cannot conclude that the EPHC costs vary with usage, given the other evidence and testimony in the record. Accordingly, consistent with our analysis of cost causation and competitive neutrality with respect to "getting started" costs, we require that EPHC costs be recovered on a per port basis.

[1190] *Id.*

[1191] *Id.*

[1192] *Id.* at 11; AT&T/WorldCom Ex. 24, at 16-17.

[1193] AT&T/WorldCom Ex. 24, at 17; *see also* Verizon Ex. 123, at 10.

[1194] Tr. at 5446-47.

[1195] Verizon Ex. 123, at 11.

[1196] *Id.* at 12-14.

[1197] *Id.*

c. RTU Fees

472. Verizon pays RTU fees to switch vendors for switch software. Verizon states that it generally does not pay RTU fees on a per MOU or on a per line basis.[1198] Rather, Verizon most often pays the RTU fees on a per switch basis.[1199] Verizon also states that, in contracts for *Lucent switches, which require software to be loaded into discrete service modules,* payment might be made on the basis of the number of service modules.[1200] Accordingly, we find that RTU fees should be recovered on a per port basis for reasons similar to those set forth above with respect to "getting started" costs and EPHC costs.

d. Shared Peak-Period Costs

473. The parties agree that shared, peak-period costs – non-ISDN line CCS and ISDN CCS, D channel access PPS, PPB channel access PPS, inter-switch PPS, and SS7 link and trunk CCS – vary with usage.[1201] They are shared capacity costs. AT&T/WorldCom emphasize, and Verizon does not dispute, that these costs are incurred for equipment that is engineered and purchased based on peak-period demand.[1202] The record supports a finding that the equipment for which these costs are incurred is a limiting resource and that congestion or blocking will occur as usage increases.[1203]

474. Peak-period users are causally responsible for shared capacity that is engineered to satisfy peak-period demand. The need to install additional capacity to avoid call blocking (or an unacceptably high rate of blocking) by installing more of this equipment results entirely from usage at its peak. If off-peak usage were to decrease to zero, no costs would be saved whatsoever. Although the parties all agree that peak-period pricing is correct in principle,[1204] no party proposes a peak-period rate structure because such an approach is extremely difficult to

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[1198] Tr. at 5492-93.

[1199] *Id.* In response to a record request, Verizon states that it generally pays for the right to use software on a "buyout basis" for base generic software. Verizon Ex. 231 (Verizon response to record request no. 47 (requested Nov. 29, 2001)). We understand the term "buyout basis" as used by Verizon to be equivalent to a per switch or per module basis. Tr. at 5494. Buyout basis may also refer to payment on the basis of all or a subset of a carrier's switches. Tr. at 5155.

[1200] Tr. at 5493.

[1201] Verizon Ex. 122, at 195; AT&T/WorldCom Ex. 12, at 109.

[1202] Verizon Ex. 109, at 53; AT&T/WorldCom Ex. 12, at 109.

[1203] Verizon Ex. 109, at 53; AT&T/WorldCom Ex. 12, at 109.

[1204] Tr. at 5475; AT&T/WorldCom Switching Cost Brief at 26.

implement in practice.[1205] Instead, Verizon and AT&T propose recovery of these costs through a per MOU price that is developed by dividing total cost by total annual minutes of use, not peak-period minutes of use, and imposed on all minutes of use.[1206] In contrast, WorldCom proposes a flat per port price for recovery of these shared, peak-period driven costs.[1207]

475. Although neither approach is ideal, we believe that the flat per port price advocated by WorldCom is the better approach. A per MOU price for recovery of these shared, peak-period driven capacity costs, as proposed by Verizon and AT&T, would fail to signal to competitive LECs that these costs vary with subscribers' usage during the peak period in particular. Competitive LECs paying for subscribers' off-peak usage based on a price developed by spreading costs over all minutes of use would pay too much relative to the costs for which they bear causal responsibility. Competitive LECs paying this same price for subscribers' peak-period usage would pay too little. A per MOU rate therefore could result in under-utilization of Verizon's switches during non-peak periods and over-utilization during peak periods.

476. A per MOU price for recovery of shared, peak-period costs also may place the competitive LEC at a competitive disadvantage, as WorldCom points out.[1208] Because Verizon's costs vary with peak-period usage, Verizon may be able to recover shared, peak-period costs from its subscribers by offering a per MOU price for peak-period minutes of use and a zero price for unlimited off-peak minutes of use. A competitive LEC may not be able to recover its costs by offering the same peak/off-peak prices that Verizon offers, however, because the competitive LEC's costs would reflect how Verizon bills the competitive LEC and not how Verizon actually incurs the cost.

477. A flat per port price for recovery of these shared, peak-period driven costs, as proposed by WorldCom, avoids the competitive concerns that arise with a per MOU charge. A flat per port price for recovery of shared, peak-period costs also avoids problems in Verizon's switch cost study associated with estimating the minutes of use over which to spread its switching costs. The Verizon study uses a ratio of busy hour minutes of use to annual minutes of minutes of use (BHAR ratio) to convert its estimate of switch costs per busy hour to switch costs per annual minutes of use. As explained above, the BHAR ratio that Verizon proposes is flawed because it significantly underestimates the annual minutes of use over which the switching costs are spread.[1209] By spreading switching costs over line ports, rather than annual minutes of use,

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[1205] For example, different switches would have different peak periods. Peak-period pricing would require either different prices for different switches based on the probabilities of peak-period usage for each switch, or developing some meaningful way to reflect peak-period usage probabilities in statewide or UNE zone average rates.

[1206] AT&T Ex. 4, at 14; Verizon Ex. 115, at 2-3.

[1207] WorldCom Ex. 6, at 5.

[1208] *Id.* at 5-6.

[1209] *See supra* section V(C)(8); *see also New Jersey 271 Order*, 17 FCC Rcd at 12295, para. 48 (noting "serious questions" regarding Verizon's assumptions underlying its busy hour determinations).

this problem is avoided.

478.   Verizon argues that flat-rated recovery of costs that vary with usage would result in low volume subscribers subsidizing high volume subscribers.[1210] We have no basis on the record to conclude that Verizon is correct. We do not know the extent to which low or high volume subscribers' usage occurs during the peak period or non-peak periods, and, therefore, we do not know whether a flat per port price or a per MOU price imposed on all subscriber minutes is more likely to recover these shared, peak-period driven costs from subscribers in proportion to their peak-period usage. Thus we cannot assess the extent to which low volume users would be subsidizing high volume users, or vice versa, under either rate structure. We acknowledge that the approach we adopt is imperfect in the sense that it would fail to signal to competitive LECs the costs that Verizon would incur if subscriber usage were to increase, which could result in over-utilization of Verizon's switches, and blocked calls, during peak periods. Given that Verizon already offers flat-rated calling to its own end-users,[1211] however, we do not believe that offering similar pricing to competitive LECs would increase the likelihood of blocked calls due to increased calling by competitive LEC customers.

479.   AT&T/WorldCom suggest that we adopt different results for the two different agreements before us.[1212] AT&T and Verizon agree that shared, peak-period costs should be recovered through a per MOU charge on all usage. As noted above, however, WorldCom argues, and we agree, that these costs should be recovered on a flat, per port basis. Thus, consistent with "baseball arbitration," we could adopt a per MOU charge for the AT&T-Verizon agreement and a flat, per port charge for the WorldCom-Verizon agreement.

480.   Verizon argues, however, that prescribing two different rate structures raises the possibility that a competitive LEC paying the flat, per port rate would target high volume users, while a competitive LEC paying the combined flat, per port and per MOU rates would target low volume users,[1213] which might preclude Verizon from recovering all of its shared costs.[1214] Verizon is correct in theory. The per port price is an average price and the per MOU price is an average price. A carrier serving low volume subscribers would pay Verizon an amount that is less than the overall cost per subscriber, if it pays for the shared peak-period driven capacity costs on a per MOU basis; a carrier serving high volume subscribers would pay Verizon an amount equal to the overall cost per subscriber, if it pays for the shared peak-period driven capacity costs on a per port basis. Verizon would not recover all of its shared costs under this scenario if it were to lose enough high volume and low volume subscribers to these competitive

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[1210] Verizon Switching Cost Brief at 23.

[1211] AT&T/WorldCom Switching Cost Brief at 26.

[1212] *See* AT&T/WorldCom Switching Cost Brief at 27.

[1213] Tr. at 5474-75.

[1214] *Id.*

LECs and is unable to recover a disproportionate share of these costs from its own subscribers.

481. AT&T/WorldCom respond that the risk of under-recovery that Verizon would face if it offers two different rate structures is no different from the risk it currently faces by offering its residential subscribers a choice between flat-rated or message unit pricing plans.[1215] They also note that a competitive LEC paying the per MOU price for unbundled switching bears the risk of paying peak-period driven capacity costs for off-peak usage , while Verizon does not incur these costs in off-peak periods or face that risk.[1216]

482. We agree with Verizon that a requirement to offer unbundled switching on both a flat-rated, per port basis and a combined flat-rated, per port and per MOU basis creates the potential for under-recovery of switching costs. AT&T/WorldCom's analogy to retail rates is not convincing. The Commonwealth of Virginia has jurisdiction over the risk of under-recovery that Verizon faces by offering its own residential subscribers flat-rated and message unit pricing options. The matter before the Bureau is the risk of under-recovery that Verizon would face if required to offer unbundled switching on both a flat-rated, per port basis and a combined flat-rated, per port and per MOU basis to wholesale customers. AT&T/WorldCom allege that the relative risk faced by Verizon due to its retail flat-rated and message unit pricing options is similar to the risk associated with offering competitive LECs both flat-rated, per port and per MOU pricing options, but they did not quantify this risk. Nor could we know, based on the record, whether this is an acceptable level of risk for Verizon to bear when selling unbundled switching to competitors. We therefore reject AT&T/WorldCom's arguments that in this proceeding we should require Verizon to offer unbundled switching on both a flat-rated, per port basis and a combined flat-rated, per port and per MOU basis.[1217]

483. Based on the potential for under-recovery that might exist if we require two different rate structures, we find that the shared, peak-period costs should be recovered on a flat, per port basis in both agreements. As explained above, this approach avoids the competitive disadvantages associated with use of a per MOU price imposed on all usage and it avoids the problems involved with estimating the minutes of use over which to spread an estimate of switching costs.

[1215] *Id.* at 5478.

[1216] *Id.* at 5479.

[1217] We recognize that the rates we establish in this arbitration proceeding reflect a different mix of port charges and usage charges than the rates contained in Verizon's agreements with other competitive LECs in Virginia. Because this would be true even if we allowed Verizon to recover the shared, peak period costs on a per MOU basis, we do not believe the existence of these other agreements is reason not to permit consistency between the two agreements at issue here.

E.   **Reciprocal Compensation**

1.   **Background**

484.   Pursuant to section 251(b)(5) of the Act, incumbent LECs are obligated to "establish reciprocal compensation arrangements for the transport and termination of telecommunications."[1218] In the *Local Competition First Report and Order*, the Commission decided that TELRIC pricing was appropriate for reciprocal compensation under section 251(b)(5).[1219]

485.   Verizon proposes two separate rate elements for reciprocal compensation: (1) "Meet-Point A End Office MOU," and (2) "Meet-Point B Tandem MOU." Meet Point A End Office MOU applies to traffic originating with a competitive LEC end-user and terminating to a Verizon end-user for which Verzion provides end-office switching, and it is designed to recover costs for end-office switching and a shared end-office trunk port.[1220] Meet-Point B Tandem MOU applies to traffic originating with a competitive LEC end-user and terminating to a Verizon end-user for which Verizon provides end-office switching, tandem switching, and shared transport.[1221] The rate for this element is designed to recover costs for end-office switching, a shared end-office trunk port, tandem switching, two shared tandem trunk ports, and shared transport.[1222]

486.   Verizon states that it developed the end-office switch usage cost for reciprocal compensation by determining the costs associated with basic usage (service without optional features). Verizon excludes, however, the "getting started" investments identified by the SCIS model and the RTU fees.[1223] According to Verizon, these costs are not affected by the additional

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[1218] 47 U.S.C. § 251(b)(5). For purposes of reciprocal compensation, "transport," under the rules now in effect, consists of "transmission and any necessary tandem switching of telecommunications traffic subject to section 251(b)(5) of the Act from the interconnection point between the two carriers to the terminating carrier's end office switch that directly serves the called party." 47 C.F.R. § 51.701(c). "Termination" is "the switching of telecommunications traffic at the terminating carrier's end office switch, or equivalent facility, and delivery of such traffic to the called party's premises." 47 C.F.R. § 51.507(d).

[1219] *Local Competition First Report and Order*, 11 FCC Rcd at 16023, para. 1054. The Commission subsequently established a set of rate caps that govern the exchange of traffic delivered to internet service providers, subject to certain conditions. *Intercarrier Compensation for ISP-Bound Traffic*, CC Docket No. 96-98, Order on Remand and Report and Order, 16 FCC Rcd 9161 (2001), *remanded sub nom. WorldCom, Inc. v. FCC*, 288 F.3d 429 (D.C. Cir. 2002). We leave it to the parties to determine under their interconnection agreements under what circumstances the rates we establish in this case will apply. *See Non-Cost Arbitration Order*, 17 FCC Rcd at 27173, para. 280.

[1220] Verizon Ex. 100P, Vol. VI, Part C-10, Supporting Information (confidential version).

[1221] *Id.*

[1222] *Id.*

[1223] Verizon Ex. 107, at 204

usage to which the reciprocal compensation rates apply, and therefore they should not be included as part of reciprocal compensation pursuant to sections 251(b)(5) and 252(d)(2)(A) of the Act.[1224] Verizon proposed a separate tandem office switch usage cost for reciprocal compensation that also excludes the "getting started" investments and RTU fees.[1225]

487. According to AT&T/WorldCom, Verizon's argument that "getting started" costs and RTU fees do not vary with usage applies equally to UNE switching and to the termination of traffic that is subject to reciprocal compensation. [1226] Accordingly, AT&T/WorldCom argue that we should adopt their proposal to recover the "getting started" cost of a switch and the associated RTU fees on a flat per port basis. In the alternative, AT&T/WorldCom argue that, if we do not adopt this proposal, these costs should be more fairly apportioned to all traffic, including traffic subject to reciprocal compensation, and not just to UNE switch usage rates.[1227] They argue that Verizon's proposal to include these costs in UNE switching rates but not in reciprocal compensation rates is inconsistent with its acknowledgement that "on a strictly technical basis, the switch does not treat either type of terminating call differently.[1228]

2.   Discussion

488. We find that end-office switch and shared end-office trunk port costs should be excluded from both Meet-Point A and Meet-Point B reciprocal compensation prices, consistent with our decision to adopt a flat, per port price for unbundled end-office switching. The general formula for developing a UNE price under TELRIC is to divide total cost by total demand. If we prescribe a flat, per line port price for unbundled end-office switching, including shared end-office trunk ports, the switch price equals total switch costs divided by total line ports. The price derived from this formula, if imposed on both competitive LECs that purchase the incumbent LEC's line ports and the incumbent LEC's end-users, would fully compensate the incumbent LEC for all of its switch costs. Competitive LECs that pay a flat, per line port price for unbundled end-office switching should not, therefore, pay the incumbent LEC any additional amount for use of end-office switching to terminate reciprocal compensation traffic.

489. We also find that "getting started" costs and RTU fees associated with tandem switches should be recovered in Meet-Point B reciprocal compensation prices, not just UNE tandem usage prices. Switch engineering requirements and therefore costs do not vary according to whether an incumbent LEC switch is terminating UNE or reciprocal compensation traffic.

[1224] Verizon Ex. 122, at 194.

[1225] Verizon Ex. 107, at 204.

[1226] *Id.* at 117.

[1227] *Id.* at 118. AT&T/WorldCom do not distinguish between end-office and tandem switching for purposes of this argument.

[1228] AT&T/WorldCom Ex. 12, at 116.

Verizon conceded that "from a cost perspective" a "terminating minute is a terminating minute" with regard to an end-office switch.[1229] There is no reason that a similar conclusion would not apply to tandem switch usage. Moreover, the Commission has adopted the same TELRIC pricing standard for UNEs and for reciprocal compensation,[1230] but Verizon admits that it applied different pricing standards in developing these rates.[1231] Tandem switch costs that are recovered in prices applying to reciprocal compensation traffic therefore should be equal to tandem switch costs that are recovered in prices applying to UNE traffic.

F.　Features

1.　Background

490.　Costs for the numerous vertical features that do not require specific, unique hardware are included in Verizon's proposed per port and per MOU switch prices.[1232] Verizon proposes "port additives" or per port prices to recover costs for 34 vertical features that have specific, unique hardware.[1233] These charges would apply only to lines that use the feature.[1234] Verizon uses the SCIS/IN module to develop the additional hardware costs associated with these vertical features. SCIS/IN bases these additional costs on vendor prices for this specific, unique hardware.[1235] The user enters as an input into SCIS/IN the price discount that the carrier receives on hardware purchases from the vendor, as well as a number of inputs relating to subscriber usage.[1236]

491.　AT&T/WorldCom do not propose separate prices for any vertical features if we adopt the MSM to develop switch costs.[1237] The MSM does not develop separate costs for any vertical features. According to AT&T/WorldCom, the composite prices derived from the MSM

[1229] Tr. at 5488-89; *see also id.* at 5501-02.

[1230] *Local Competition First Report and Order*, 11 FCC Rcd at 16023, para. 1054.

[1231] Tr. at 5505.

[1232] Verizon Ex. 107, at 181-182.

[1233] *Id.* at 182.

[1234] Tr. at 5520-21.

[1235] Verizon Ex. 107, at 205.

[1236] For example, to develop the distinctive ringing/call waiting (DRCW) feature offered in connection with Centrex service, the user must specify the number of: (1) busy hour (BH) screen line editing (SLE) sessions per line; (2) entries added per BH SLE session; (3) entries deleted per BH SLE session; (4) holding time seconds per session; (5) BH DRCW calls per line; and (6) SLE lines per central office.

[1237] AT&T/WorldCom Switching Cost Brief at 8.